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| 09/813,525      | 03/21/2001  | Simon Daniel Boland  | 400048-A-01-US(Boland) | 3564             |

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P.O. BOX 629  
Holmdel, NJ 07920

EXAMINER

VO, HUYEN X

ART UNIT PAPER NUMBER

2655

DATE MAILED: 03/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/813,525

**Applicant(s)**

BOLAND, SIMON DANIEL

**Examiner**

Huyen Vo

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 6, 12, 16(1), 16(2), 16(6), 16(12), 17(1), 17(2), 17(6), 17(12), and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over International Telecommunication Union (ITU-T), (A Silence compression scheme for G.729 optimized for terminals conforming to Recommendation V.70, Annex B (11/96), pp. Title-16) in view of Kwan (US Patent No. 6504838).

1. Regarding claim 1, ITU-T discloses a method of voice activity detection comprising:

determining a difference between a running averages of energy and the average energy of the current frame (B.3.4.2, page 5).

in response to the difference either being exceeded by a first threshold value or exceeding a second threshold value greater than the first threshold value, indicating that the signal includes a voice signal (this is can be interpreted as the absolute value of the difference is less than a threshold value, and equations 3-6 in section B.3.5 on page 6 read on this limitation).

ITU-T fails to disclose the ratio of energy above a first threshold frequency in a signal comprising multiple frequencies and energy below the first threshold frequency in the signal. However, Kwan teaches the ratio of energy above a first threshold frequency in a signal comprising multiple frequencies and energy below the first threshold frequency in the signal (col. 42, ln. 62-67). The advantage of using the teaching of Kwan in the ITU-T is to enhance signal activity detection accuracy.

Since ITU-T and Kwan are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify ITU-T by incorporating the teaching of Kwan in order to enhance signal activity detection accuracy.

2. Regarding claim 2, the modified ITU-T fails to specifically disclose that the first threshold frequency is about 2400 Hz. However, it would have been obvious to one of ordinary skill in the art the energy of the voice signal is mostly concentrated at in the region up to 2400 Hz. Therefore, it is necessary to choose this frequency threshold in order to increase detection reliabilities.

3. Regarding claim 6, UTI-T further discloses repeating the steps for successive segments of the signal (VAD flow chart). UTI-T fails to disclose the ratio of energy above a first threshold frequency in a signal comprising multiple frequencies and energy below the first threshold frequency in the signal (as included in claim 1). However, Kwan teaches the ratio of energy above a first threshold frequency in a signal

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comprising multiple frequencies and energy below the first threshold frequency in the signal (col. 42, ln. 62-67). The advantage of using the teaching of Kwan in the ITU-T is to enhance signal activity detection accuracy.

Since ITU-T and Kwan are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify ITU-T by incorporating the teaching of Kwan in order to enhance signal activity detection accuracy.

4. Regarding claim 12, the modified ITU-T further discloses a method for determining a difference between the average total energy and the present total energy comprises determining a difference between average total energy in a voiceband of the signal and present total energy in the voiceband (section B.3.4.2).

5. Regarding claims 16(1), 16(2), 16(6), and 16(12), the modified ITU-T fails to specifically disclose an apparatus that performs the method of any one of the claims 1-2, 6, and 12. However, it would have been obvious to one of ordinary skill in the art that an apparatus is needed to perform the method mentioned in claims 1-2, 6, and 12.

6. Regarding claims 17(1), 17(2), 17(6), and 17(12), the modified ITU-T fails to specifically disclose a computer-readable medium containing executable instructions which, when executed in a computer, cause the computer to perform the method of any one of the claims 1-2, 6, and 12. However, it would have been obvious to one of

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ordinary skill in the art that a software program can be written to perform the method of claims 1-2, 6, and 12. The software program can provide conveniences for maintaining and updating the system.

7. Regarding claim 18, ITU-T discloses an apparatus for detecting voice activity comprising:

means for determining a difference between a running averages of energy and the average energy of the current frame (B.3.4.2, page 5).

means cooperative with the means for determining a difference and responsive to the difference either being exceeded by a first threshold value or exceeding a second threshold value greater than the first threshold value, for indicating that the signal includes a voice signal (this is can be interpreted as the absolute value of the difference is less than a threshold value, and equations 3-6 in section B.3.5 on page 6 read on this limitation).

ITU-T fails to specifically disclose means for determining the ratio of energy above a first threshold frequency in a signal comprising multiple frequencies and energy below the first threshold frequency in the signal. However, Kwan teaches the ratio of energy above a first threshold frequency in a signal comprising multiple frequencies and energy below the first threshold frequency in the signal (col. 42, ln. 62-67). The advantage of using the teaching of Kwan in the ITU-T is to enhance signal activity detection accuracy.

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Since ITU-T and Kwan are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify ITU-T by incorporating the teaching of Kwan in order to enhance signal activity detection accuracy.

Claims 3-5, 13, 16(3)-16(5), 16(13), 17(3)-17(5), and 17(13), are rejected under 35 U.S.C. 103(a) as being unpatentable over International Telecommunication Union (ITU-T) (A Silence compression scheme for G.729 optimized for terminals conforming to Recommendation V.70, Annex B (11/96), pp. Title-16) in view of Kwan (US Patent No. 6504838), further in view of Ashley (US Patent No. 6104993).

8. Regarding claim 3, the modified ITU-T fails to specifically disclose a method for removing noise energy from the signal prior to the determining step. However, Ashley teaches a method for removing noise energy from the signal prior to the determining step (col. 4, ln. 1-12). The advantage of using the teaching of Ashley in the modified ITU-T is to remove low frequency noise from the signal to increase signal detection accuracy.

Since the modified ITU-T and Ashley are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Ashley in order to remove low frequency noise from the signal to increase signal detection accuracy.

9. Regarding claims 4-5, the modified ITU-T as applied in claim 3 further discloses a method for filtering out from the signal frequencies below a second threshold frequency lower than the first threshold frequency (col. 4, ln. 1-12, because of the fact that  $120 \text{ Hz} < 2400 \text{ Hz}$ ) and the second threshold frequency is about 100 Hz (col. 4, ln. 1-12).

10. Regarding claim 13, the modified ITU-T fails to specifically disclose that the voiceband extends from about 100 Hz to about 4000 Hz. However, Ashley teaches a high pass filter with a cut off frequency of 120 Hz (col. 1-18). The advantage of using the teaching of Ashley in the modified ITU-T is to remove low frequency noise to enhance signal activity detection accuracy.

Since the modified ITU-T and Ashley are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Ashley in order to remove low frequency noise from the signal to increase signal detection accuracy.

The modified still fails to specifically disclose that the voiceband extends to about 4000 Hz. However, it would have been obvious to one of ordinary skill in the art that 4000 Hz is the range of a human speech signal.



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11. Regarding claims 16(3)-16(5), and 16(13), the modified ITU-T fails to specifically disclose an apparatus that performs the method of any one of the claims 3-5, and 13. However, it would have been obvious to one of ordinary skill in the art that an apparatus is needed to perform the method mentioned in claims 3-5, and 13.

12. Regarding claims 17(3)-17(5) and 17(13), the modified ITU-T fails to specifically disclose a computer-readable medium containing executable instructions which, when executed in a computer, cause the computer to perform the method of any one of the claims 3-5 and 13. However, it would have been obvious to one of ordinary skill in the art that a software program can be written to perform the method of claims 3-5 and 13. The software program can provide conveniences for maintaining and updating the system.

Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over International Telecommunication Union (ITU-T) (A Silence compression scheme for G.729 optimized for terminals conforming to Recommendation V.70, Annex B (11/96), pp. Title-16) in view of Kwan (US Patent No. 6504838), further in view of Benyassine et al. (US Patent No. 6275794).

13. Regarding claim 19, ITU-T further discloses means for determining an average periodicity of the signal (section B.3.1.4, zero crossing rate is a well-known method used to determine the periodicity of a signal), but fails to specifically means cooperative

with means for determining an average periodicity and responsive to the average periodicity being lower than a third threshold value, for indicating that the signal includes a voice signal.

However, Benyassine et al. teach means cooperative with means for determining an average periodicity and responsive to the average periodicity being lower than a third threshold value, for indicating that the signal includes a voice signal (col. 4, ln. 1-7 and col. 7, ln. 46-56). The advantage of using the teaching of Benyassine et al. in the modified ITU-T is to enhance voice activity detection accuracy.

Since the modified ITU-T and Benyassine et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Benyassine et al. in order to enhance voice activity detection accuracy.

14. Regarding claim 20, ITU-T further discloses: means for determining a difference between average total energy in the signal and present total energy in the signal (section B.3.42 on page 5); and means cooperative with the means for determining a difference between the average total energy and the present total energy and the means for determining an average periodicity and responsive to the difference between the average total energy and the present total energy being lower than a fourth threshold value, indicating that the signal includes a voice signal (equations 3-6 in section B.3.5 on page 6).

ITU-T fails to specifically disclose that the average periodicity of the signal being lower than the fifth threshold value, for indicating that the signal includes a voice signal. However, Benyassine et al. further teach that the average periodicity of the signal being lower than the fifth threshold value, for indicating that the signal includes a voice signal (col. 4, ln. 1-7 and col. 7, ln. 46-56). The advantage of using the teaching of Benyassine et al. in the modified ITU-T is to enhance voice activity detection accuracy by including another parameter in the analysis.

Since the modified ITU-T and Benyassine et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Benyassine et al. in order to process all the frames and enhance voice activity detection accuracy by including another parameter in the analysis.

15. Regarding claim 21, ITU-T further discloses an apparatus comprising:

means responsive to a lack of indication for a present segment of the signal that the signal includes a voice signal and to an indication for a segment of the signal preceding the present segment that the signal includes a voice signal, for determining if the average total energy of the signal exceeds a minimum average total energy of the signal by a sixth threshold value (B.3.6 on page 7-8); and

means cooperative with the means for determining of the average total energy exceeds the minimum average total energy and responsive to the average total energy

exceeding the minimum average total energy by the sixth threshold value, for indicating that the signal includes a voice signal (B.3.6 on page 7-8).

Claims 7-11, 14-15, 16(7)-16(11), 16(14)-16(15), 17(7)-17(11), and 17(14)-17(15) are rejected under 35 U.S.C. 103(a) as being unpatentable over International Telecommunication Union (ITU-T) (A Silence compression scheme for G.729 optimized for terminals conforming to Recommendation V.70, Annex B (11/96), pp. Title-16) in view of Kwan (US Patent No. 6504838), further in view of Ashley (US Patent No. 6104993), and further in view of Benyassine et al. (US Patent No. 6275794).

16. Regarding claim 7, ITU-T further discloses a method for determining an average periodicity of the signal (section B.3.1.4, zero crossing rate is a well-known method used to determine the periodicity of a signal), but fails to specifically disclose that in response to the average periodicity of the signal being lower than a third threshold value, indicating that the signal includes a voice signal.

However, Benyassine et al. teach that in response to the average periodicity of the signal being lower than a third threshold value, indicating that the signal includes a voice signal (col. 4, ln. 1-7 and col. 7, ln. 46-56). The advantage of using the teaching of Benyassine et al. in the modified ITU-T is to enhance voice activity detection accuracy.

Since the modified ITU-T and Benyassine et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill

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in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Benyassine et al. in order to enhance voice activity detection accuracy.

17. Regarding claim 8, the modified ITU-T fails to specifically disclose a method wherein:

determining an average periodicity comprises estimating a pitch period of the signal; determining a gain value of the signal over the pitch period as a function of the estimated pitch period; determining a periodicity of the signal over the pitch period as a function of the estimated pitch period and the gain value; and averaging the determined periodicity with previously-determined at least one said determined periodicity.

However, Benyassine et al. further teach a method wherein: determining an average periodicity comprises estimating a pitch period of the signal (col. 3, ln. 59 to col. 4, ln. 7); determining a gain value of the signal over the pitch period as a function of the estimated pitch period (col. 4, ln. 1-62); determining a periodicity of the signal over the pitch period as a function of the estimated pitch period and the gain value (equation on col. 4, line 6); and averaging the determined periodicity with previously-determined at least one determined periodicity (col. 4, ln. 1-7). The advantage of using the teaching of Benyassine et al. in the modified ITU-T is to enhance voice activity detection accuracy.

Since the modified ITU-T and Benyassine et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Benyassine et al. in order to enhance voice activity detection accuracy.

18. Regarding claim 9, ITU-T further discloses a method for repeating the steps for successive segments of the signal as applied in claim 7 (VAD flowchart on page 3), but fails to specifically disclose that in response to the average periodicity of the signal being lower than a third threshold value, indicating that the signal includes a voice signal.

However, Benyassine et al. teach that in response to the average periodicity of the signal being lower than a third threshold value, indicating that the signal includes a voice signal (col. 4, ln. 1-7 and col. 7, ln. 46-56). The advantage of using the teaching of Benyassine et al. in the modified ITU-T is to process all the frames and enhance voice activity detection accuracy.

Since the modified ITU-T and Benyassine et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Benyassine et al. in order to process all the frames and enhance voice activity detection accuracy.

19. Regarding claim 10, ITU-T further discloses: determining a difference between average total energy in the signal and present total energy in the signal (section B.3.42 on page 5); and in response to the difference between the average total energy and the present total energy being lower than a fourth threshold value, indicating that the signal includes a voice signal (equations 3-6 in section B.3.5 on page 6). ITU-T fails to

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specifically disclose that the average periodicity of the signal being lower than a fifth threshold value, indicating that the signal includes a voice signal.

However, Benyassine et al. further teach that the average periodicity of the signal being lower than a fifth threshold value, indicating that the signal includes a voice signal (col. 4, ln. 1-7 and col. 7, ln. 46-56). The advantage of using the teaching of Benyassine et al. in the modified ITU-T is to enhance voice activity detection accuracy by including another parameter in the analysis.

Since the modified ITU-T and Benyassine et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Benyassine et al. in order to process all the frames and enhance voice activity detection accuracy by including another parameter in the analysis.

20. Regarding claim 11, the modified ITU-T fails to specifically disclose a method for removing noise energy from the signal prior to determining the difference between the average total energy and the present total energy. However, Ashley further teaches a method for removing noise energy from the signal prior to the determining step (col. 4, ln. 1-12). The advantage of using the teaching of Ashley in the modified ITU-T is to remove low frequency noise from the signal to increase signal detection accuracy.

Since the modified ITU-T and Ashley are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify ITU-T by incorporating the teaching of

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Ashley in order to remove low frequency noise from the signal to increase signal detection accuracy.

21. Regarding claim 14, ITU-T discloses method of repeating the steps for successive segments of the signal as applied to claim 10 (VAD flowchart), but fails to specifically disclose that the average periodicity of the signal being lower than a fifth threshold value, indicating that the signal includes a voice signal.

However, Benyassine et al. further teach that the average periodicity of the signal being lower than a fifth threshold value, indicating that the signal includes a voice signal (col. 4, ln. 1-7 and col. 7, ln. 46-56). The advantage of using the teaching of Benyassine et al. in the modified ITU-T is to enhance voice activity detection accuracy by including another parameter in the analysis.

Since the modified ITU-T and Benyassine et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify ITU-T by incorporating the teaching of Benyassine et al. in order to process all the frames and enhance voice activity detection accuracy by including another parameter in the analysis.

22. Regarding claim 15, ITU-T further discloses a method comprising:

in response to not indicating for a present segment of the signal that the signal includes a voice signal, and indicating for a segment of the signal preceding the present segment that the signal includes a voice signal, determining if the average total energy



of the signal exceeds a minimum average total energy of the signal by a sixth threshold value (B.3.6 on page 7-8); and

in response to the average total energy exceeding the minimum average total energy by the sixth threshold value, indicating that the signal includes a voice signal (B.3.6 on page 7-8).

23. Regarding claims 16(7)-16(11) and 16(14)-16(15), the modified ITU-T fails to specifically disclose an apparatus that performs the method of any one of the claims 7-11 and 14-15. However, it would have been obvious to one of ordinary skill in the art that an apparatus is needed to perform the method mentioned in claims 7-11 and 14-15.

24. Regarding claims 17(7)-17(11), and 17(14)-17(15), the modified ITU-T fails to specifically disclose a computer-readable medium containing executable instructions which, when executed in a computer, cause the computer to perform the method of any one of the claims 7-11 and 14-15. However, it would have been obvious to one of ordinary skill in the art that a software program can be written to perform the method of claims 7-11 and 14-15. The software program can provide conveniences for maintaining and updating the system.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kim et al. (US Patent No. 6687668) and Tokura et al. (US Patent


No. 4074069) disclose a method for detecting voice activity that is considered pertinent to the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huyen Vo whose telephone number is 703-305-8665. The examiner can normally be reached on M-F, 9-5:30.

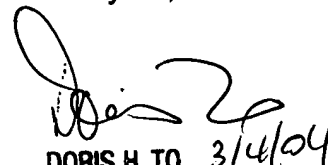
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner Huyen X. Vo

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February 29, 2004

  
DORIS H. TO 3/4/04  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600